

REMARKS

Claims 1 and 4-10 are pending in the present application.

In the outstanding Official Action, claims 1 and 4-10 were rejected under 35 USC §103(a) as allegedly being unpatentable over KAISAKI et al (KAISAKI). Applicants respectfully traverse that rejection.

KAISAKI discloses an abrasive article and a working liquid for polishing metals. The purpose of the abrasive article is to eliminate inorganic particulates in working liquids. KAISAKI discloses the working liquid may contain less than 1% inorganic particulates, such as the recited silica, but KAISAKI most prefers 0% inorganic particulates( col. 2, lines 9-29, especially col.15, lines 30-37). KAISAKI also discloses other numerous components for the working liquid, and in one example includes a chelating agent, oxidizing agent, passivating agent, and water (column 15, lines 38-40). As to the particular chelating agent, KAISAKI discloses an extensive list of possible chelating agents, which includes the recited 1,3-diketones (column 14, lines 11-16). As to the particular passivating agent, KAISAKI discloses several possible passivating agents, including the recited benzotriazole (column 14, line 63 to column 15, line 14).

The Official Action acknowledges that KAISAKI does not disclose the recited combination of silica, oxidizing agent,

benzotriazole, diketone, and water in the chemical mechanical polishing slurry composition of claim 1. Nevertheless, the Official Action concludes that "any" combination of components taught by KAISAKI, including the recited weight content and weight ratio of diketone and benzotriazole compounds recited in claims 1, 6, 9 and 10, would have been obvious for the purpose of removing a second material from the surface of a first material under the action of an abrasive article, absent a showing of unexpected results.

KAISAKI clearly does not disclose the specific combination of 1,3-diketones with benzotriazole. In fact, the 1,3-diketones and benzotriazole are not even directly related to each other in the disclosure of KAISAKI. One of ordinary skill in the art must select both a particular type of chelating agent, 1,3-diketones, and a particular passivating agent, benzotriazole, from an extensive number of possible combinations, without any guidance from KAISAKI in order to approach the claimed invention.

Furthermore, while KAISAKI may disclose a weight content for benzotriazole in a few examples, KAISAKI does not disclose a weight content for 1,3-diketones. Thus, one must not only select the combination of 1,3-diketones and benzotriazole, but one must further select a particular weight content of 1,3-diketones absent any guidance from KAISAKI in order to arrive at the claimed invention.

KAISAKI also offers no clear guidance as to the selection of inorganic particulates, such as silica, for any composition. KAISAKI discloses the purpose of the abrasive article is to eliminate the inorganic particulates in working liquids. KAISAKI discloses working liquids with, at most, less than 1% inorganic particulates, and preferably 0% inorganic particulates. Accordingly, KAISAKI does not provide any clear guidance for one of ordinary skill in the art to add inorganic particulates, considering it is the less preferred embodiment that is contrary to the purpose of the invention.

As KAISAKI fails to disclose or suggest the recited composition, the Patent Office must provide some suggestion for modifying KAISAKI to meet its burden of establishing prima facie obviousness. Instead, the Official Action states that it would have been obvious to select "any" combination of components and "any" weight content and weight ratio of diketone and benzotriazole for the intended purpose disclosed by applicant. The Patent Office does not provide any suggestions for the preferential selection of 1,3-diketones with benzotriazole at a particular weight ratio and content or selection of a less preferred embodiment with a particular inorganic particulate, such as silica. Thus, the Patent Office has not met its burden of establishing prima facie obviousness, and claims 1, 6, 9 and 10 are not rendered obvious by KAISAKI.

Notwithstanding the fact that the Official Action fails establish prima facie obviousness, the claimed composition is nevertheless non-obvious over KAISAKI because the composition produces unexpected results. Table 1 of the present specification demonstrates the recited weight ratio of diketones to benzotriazole in claims 1 and 6 and the weight content recited in claims 9 and 10 produce unexpected results.

Chemical mechanical polishing slurries of the recited weight ratio and weight content of diketones and benzotriazole yield copper polishing rates lower than the rate from a slurry consisting of either benzotriazole or diketones at the same weight content (See Slurry Nos. 1-3 compared to Slurry No. 5 in Table 1). However, according to KAISAKI, one of ordinary skill in the art would have expected that a slurry comprising 1,3-diketones and benzotriazole at the recited content and ratio would yield a copper polishing rate equal to, if not greater than, the rate of a slurry consisting of benzotriazole at the same weight content. KAISAKI discloses that passivating agents (i.e. benzotriazole) decrease polishing rates and that chelating agents (i.e. 1,3 diketones) increase polishing rates (col. 13, l. 57-60 and col. 15, l. 5-18). Thus, KAISAKI fails to disclose or suggest the unexpectedly lower copper polishing rates of the claimed composition.

Furthermore, the tantalum barrier film polishing rate is relatively unaffected by the recited slurry having the diketones

and benzotriazole combination as compared to the rate of a slurry with benzotriazole alone. As a result, the recited composition unexpectedly enables one to remove the tantalum barrier film at the same rate achieved with benzotriazole alone, for example, but prevents the excessive polishing of the copper that occurs with benzotriazole alone. KAISAKI fails to disclose or suggest a change in slurry composition could significantly lower the copper polishing rate without significantly affecting the tantalum film polishing rate.

Thus, as the recited composition of claims 1, 6, 9 and 10 produce unexpected results, claims 1, 6, 9 and 10 are non-obvious over KAISAKI.

Claims 4 and 5 depend from claim 1, and are, therefore, are also non-obvious over KAISAKI.

Claims 7 and 8 are independently non-obvious from claim 1, directed to a slurry comprising not less than 1%, and not greater than 10%, silica polishing material. As discussed above, KAISAKI limits the particulates to less than 1% of the working liquid. KAISAKI neither discloses nor suggests an amount of inorganic particulates not less than 1%. However, Claims 7 and 8 were rejected along with claims 1, 4-6, 9 and 10 as being obvious over KAISAKI, and the Official Action does not provide any suggestion for modifying KAISAKI to obtain the recited features of claims 7 and 8. Thus, the Patent Office has failed to meet its

burden of establishing prima facie obviousness, and claims 7 and 8 are not rendered obvious by KAISAKI.

Therefore, applicants respectfully request that the obviousness rejection be withdrawn.

In view of the foregoing remarks, applicants believe that the present application is in condition for allowance at the time of the next Official Action. Allowance and passage to issue on that basis is respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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